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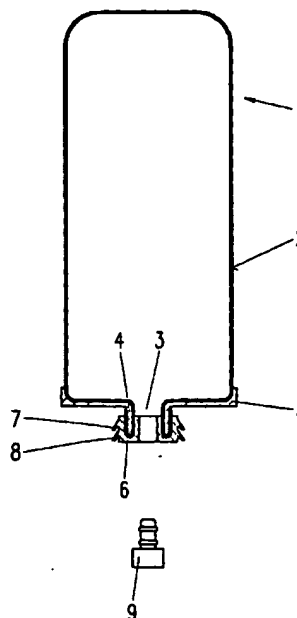
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**(54) Thin wall cartridge for use within a reusable dispenser**

(57) The package assembly to be used within a reusable cartridge for dispensing at least one component comprises a container with a thin, flexible membrane wall (2) with an open end (3) and further comprises a front outlet (5) to which the open end (3) of the membrane container (2) is secured by a ring-shaped sealing element (6).

This membrane container outlet end allows conventional filling of the container and a perfect seal at the front outlet (5).

FIG. 1



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## Description

**[0001]** The use of two component cartridge systems is well known for the storage, metering and mixing of two component reactive chemical systems such as epoxies, polyurethanes, acrylics, silicones, polysulfides and polyesters. It is also well known that, as an alternative cartridge system for environmental reasons, sausage type packages with thin plastic/foil laminate membrane walls are used to contain such chemicals. These packages are fitted within and supported by a cartridge like structure while the contents are dispensed. When depleted, the packages may be disposed of while the whole or majority of the supporting cartridge structure is to be reused.

**[0002]** It is within this field of sausage type package use that certain problems are seen to arise, for example with containers for flowable substances according to US-A-5 332 122 or 5 501 368. The package requires to be fabricated from flexible plastic foil/laminate sheet which is folded to form a tube and then partially overlapped and welded together such that, along the weld length, the now double layer seam is thicker and less flexible than the rest of the package wall and is subject to potential leakage due to weld failure. This fabrication of the container tube takes place as the first stage of a complex continuous fabrication, filling and closing process and continues after the initial closing of the tube with the immediate chemical filling of the tube as the second stage. The third stage involves the dividing off and closing of the, now, filled tube into volumetrically controlled lengths. At these division points, the filled tube diameter is reduced all the way to the tube axis which results in considerable wrinkling of the tube wall prior to being closed by a crimped ring. Such crimped ring closures often fail to achieve an effective seal due to the incompressibility of the membrane and of the wrinkled overlaps which, in themselves, tend to form leak paths under pressure. For the same reasons, the necessary sealing of the wrinkled tube wall against a front outlet is another failure area. In addition, and at a time just prior to the package use and after it has been placed within a reusable cartridge support structure, the package outlet end requires to be opened and this is done by cutting behind the crimped ring closure of the package. This opening of the package outlet end allows the package to settle down and adjust its outer shape to that of the internal diameter of the supporting structure and in doing so, air is induced into the package and especially so with lower viscosity chemicals. Thus, since it is well known that any air within a metering package causes the content to be non - hydraulic and therefore compressible, the effect can be that both the start and the stop of each of the two metered flows go out of synchronisation relative to each other and result in an "off ratio" mixture when being processed through a static mixer. Furthermore and at the end of the discharge stroke, an unacceptable residual volume of

chemical is left within the centre of the collapsed package due to its incomplete compaction as a result of the membrane having been scraped off the outer supporting structure wall, folded and compacted in a more or less ring shaped like fashion.

**[0003]** Alternatively, if a fabricated membrane container with a longitudinal seam is used for a package, problems arise in particular at the outlet of the package. One proposal, according to US-A-S 647 510, provides at the outlet end an outlet piece to which the straight end of the membrane container wall is adhered, such adhesion being difficult to achieve in a leak proof and reliable fashion.

**[0004]** Starting from the aforementioned prior art, it is an object of the present invention to provide a thin wall membrane package which overcomes the above mentioned drawbacks and especially provides a proper sealing and closure of its outlet end. This object is attained with the package of independent claim 1.

**[0005]** A further object is to avoid the problems arising from the fabricated sausage type package with longitudinal seams and a rear end closure. This object is attained with the package of independent claim 2. The therein defined package assembly proposes an integrally formed, uniform and seamless thin flexible membrane wall container so as to avoid any chance of seam joint or rear end closure failure.

**[0006]** Above all and as opposed to the highly complex and necessarily combined fabrication and filling process, which entails both high initial capital investment such that it is only economically viable for long production runs and high "setting up" costs prior to each production run, an environmentally advantageous package is proposed with the major advantages of being fillable by existing conventional cartridge filling methods and at the same time avoiding the entrapment of air within the liquid chemical content.

**[0007]** Preferred embodiments of the invention will now be described in detail by reference to the accompanying drawing.

Fig. 1 shows a longitudinal cross-section of a first embodiment of the invention,

Fig. 2 shows a longitudinal cross-section of a second embodiment of the invention,

Fig. 3 shows the package of Fig. 1 prior to filling,

Fig. 4 shows the package of Fig. 3 after filling,

Fig. 5 shows a longitudinal cross-section of a cartridge assembly with two packages of Fig. 4 in two different stages of dispensing,

Figs. 6-8 each shows a longitudinal cross-section of three different package assembly clo-

tures,

Fig. 9 shows a variant of the embodiment of Fig. 5, and

Fig. 10 shows a further embodiment of the invention.

**[0008]** Fig. 1 shows a longitudinal cross-section of a bottle shaped package assembly 1 having an integrally formed and seamless thin flexible wall 2 with an open neck end 3 passing through the inside of the tube 4 of a front outlet 5, the flexible wall 2 being folded back over the front outside diameter of that tube 4. A sealing ring 6, with lips 7 and 8 for sealing against the cartridge outlet, is fitted over the flexible wall 2 on the inside and outside of the tube 4, the sealing ring 6 being formed to receive a separate sealing plug 9.

**[0009]** It follows from the above that the package is made bottle shaped so as to essentially match the internal shape of the supporting structure before its insertion such that it minimises the necessary adjustment of the external shape of the package to that of the supporting structure which could otherwise lead to air induction into the package when inside the supporting structure and opened prior to dispensing. Furthermore and in comparison with the „state of the art“ package which has two closed off ends, this aspect of the invention proposes a package assembly with one closable open neck end only, the open neck end having a reduced diameter with the advantage of the entire package wall having no wrinkles whatsoever.

**[0010]** The other aspect of the invention for a fabricated sausage type package according to Fig. 2 proposes the use of a compressible plug, rod or mushroom like device held within the closed wrinkled wall end such that the closure means, for instance a crimped ring, creates and maintains a compressive tension, the compressible device itself acting as an expanding and self adjusting sealing bung.

**[0011]** Fig. 2 shows a longitudinal cross-section of a package assembly 11 having a fabricated thin flexible wall 12 with two open ends, one being closed by a crimped ring 13 against a central compressible mushroom shaped device 14. At the front of the package assembly 11, the open neck end 15 passes through the inside of the tube 4 of the front outlet 5 and is folded back over the front outside of tube 4 with a sealing ring fitted as shown in Fig. 1.

**[0012]** According to the characteristics of the chemicals to be stored in the containers, the membrane container wall comprises one or more layers of the same material or of different materials.

**[0013]** Fig. 3 shows a longitudinal cross-section of a bottle shaped package assembly 1, as shown in Fig. 1, with the rear part of the flexible membrane wall 2 having been folded over within itself and „outside-in“ down to the inside of the front outlet 5 by a plunger 17. This col-

lapsed bottle shaped package within a rigid structure 60 now being ready for filling, the air previously contained within the package assembly having been evacuated by vacuum.

**[0014]** Fig. 4 shows a longitudinal cross-section of the same package assembly 1 as in Fig. 3 but after filling with chemical 16 and plugging.

**[0015]** Fig. 5 shows a longitudinal cross-section of a cartridge assembly 18 which retains package assemblies 1A and 1B with chemical contents 16A, 16B within cylinders 20A, 20B and sealing those package assemblies 1A and 1B against cartridge outlet 21 via the sealing means 6A, 6B and lips 7, 8. Package assembly 1A is shown with the driven piston 22A, with lip 23A, attached to the back of the package assembly 1A and drive plunger 24A, with drive rod 25A, ready for forward movement. Package assembly 1B is shown in a partly dispensed state with the driven piston 22B, with lip 23B, having been pushed down within the cylinder 20B by the drive plunger 24B and drive rod 25B such that the package assembly 1B has been turned „outside in“ within itself while displacing the chemical content 16B via the cartridge outlet 21.

**[0016]** Fig. 6 shows a longitudinal cross-section of a variation of a package assembly closure embodiment in the form of a package assembly sealing ring 6, serving as retaining means for the sealing and securing means of the membrane in the form of an O-ring 26 on the outside diameter of tube 4 which is provided with a groove 36. The retaining ring 6 is also provided with a single sealing lip 8 and is closed off by a sealing plug 9.

**[0017]** Fig. 7 shows the same package assembly closure embodiment as Fig. 6 with the exception of the inner part 39 of sealing ring 28 having an attached burstable or pierceable diaphragm 33. It is evident that the sealing and securing O-ring stands for any appropriate sealing element.

**[0018]** Fig. 8 shows a longitudinal cross-section of a variation of the package assembly closure embodiment of Fig. 6 in the form of a sealing ring 34 incorporating a spring loaded valve 41 which facilitates air free filling of the package and is opened by a pin 35 attached to the cartridge outlet.

**[0019]** Fig. 9 shows one side only of a longitudinal cross-section of a cartridge assembly 18 similar to that shown in Fig. 5 in that it retains the package assembly 1A with chemical contents 16A within cylinder 20A but with the variation that the neck of the membrane 2A is sealed and secured on the outside of the tube 4 of the front outlet 5A by O-ring 26 within an external groove 31, the O-ring 26 being compressed against the cartridge outlet 21 so as to form a ring sealing means between that cartridge outlet 21 and the membrane 2A. Also, the inside of the tube 4 is fitted with a closure having a burstable diaphragm 33 as shown in Fig. 7.

**[0020]** Fig. 10 shows a longitudinal cross-section of one side of a cartridge assembly 58 which retains package assembly 42A with chemical contents 16A within

the cartridge cylinder 43A, the full diameter outlet end 44E of container membrane 44 being secured and sealed between O-ring 45 and the O-ring groove 46 within the outer periphery 49 of the front outlet 47, the securing O-ring 45 being retained by the retaining ring 48 against the outer periphery of the front outlet 47. In addition, under operating conditions, the wall 44E of the membrane 44 is further sealed by the action of the pressure actuated lip 59. Lip 59 can either press on the outlet end of cartridge cylinder wall 43A or on its continuation, the wall of retaining ring 48.

**[0021]** The tube 51 of the front outlet 47 is closed by sealing ring 52 via O-ring 53 in groove 54, the end 55 of the inner part 56 of sealing ring 52 having a burstable diaphragm 33 attached. The package assembly 42A is shown sealed against the cartridge outlet 57 via the sealing ring means 52 with lips 7A, 8A.

**[0022]** It follows that a sealed outlet closure is achieved regardless of the fact if the flexible membrane wall is seamless or not or if the container is bottle-shaped or not. The proposed method and the closure means allow also the filling of the container without any air inclusion.

**[0023]** The embodiment with a sealing ring incorporating a spring loaded valve facilitates the container to be collapsed and evacuated, to maintain evacuation prior to air free filling, to maintain the filled condition without leakage and the trouble free insertion into the supporting cartridge structure and connection to the cartridge outlet prior to use.

#### Claims

1. A package assembly to be used within a reusable cartridge for dispensing at least one component, the package assembly comprising a container having a thin, flexible membrane wall with an open end, characterized in that the package assembly (1, 1A, 1B, 11, 42A) further comprises a front outlet (5, 5A; 47) to which the open end (3, 15, 44E) of the flexible membrane wall (2, 2A, 12, 44) is secured by a ring-shaped sealing element (6, 6A, 6B, 34) or by a ring-shaped sealing element (26, 45) retained by a retaining means (6, 28, 48).
2. A package assembly to be used within a reusable cartridge for dispensing at least one component, the package assembly comprising a container having a thin, flexible membrane wall with an open end (3, 44E), characterized in that the thin, flexible membrane wall (2, 2A, 44A) of the container (1, 1A, 1B, 42A) is integrally formed and seamless.
3. A package assembly according to claim 1, characterized in that the container has a fabricated, thin, flexible membrane wall (12) with a closed end (13, 14) and an open end (15).
4. A package assembly according to claim 2, characterized in that the open end (3, 44E) of the membrane container (2, 2A, 44A) is secured to the front outlet (5, 47) by a ring-shaped sealing element (6, 6A, 6B, 34) or by a ring-shaped sealing element (26, 45) retained by a retaining means (6, 28, 48).
5. A package assembly according to any of claims 1 to 4, characterized in that the membrane container is made with an open neck end (3, 15), the external shape of which essentially matches the internal shape of a supporting structure.
6. A package assembly according to claim 5, characterized in that the membrane container is bottle shaped and has a closure element (9, 33, 41).
7. A package assembly according to claim 5 or 6, characterized in that the front outlet (5) of the package comprises a tube (4) having as a ring shaped sealing element a sealing ring (6, 6A, 6B, 28, 34) fitted around the outlet end of the tube for attaching and sealing the open neck end (3, 15).
8. A package assembly according to any of claims 1 to 6, characterized in that the open neck end (3, 15) of the membrane wall is secured in a groove (31, 36) at the outer diameter of the front outlet tube (4) by a ring shaped sealing element (26) retained by the sealing ring (6, 28) or by the bore of the cartridge outlet (21).
9. A package assembly according to any of claims 1 to 4, characterized in that the end of membrane wall (44E) is secured in a groove (46) at the periphery of the front outlet (47) by the sealing element (45) retained by the retaining ring (48).
10. A package assembly according to claim 9, characterized in that the front outlet (47) comprises a sealing lip (59), sealing the membrane wall (44) against the cartridge wall (43A) or the sealing ring (48).
11. A package assembly according to claim 9 or 10, characterized in that the front outlet (47) comprises a tube (51) and a sealing ring (52) fitted around the tube having a closure element (9, 33, 41).
12. A package assembly according to any of claims 1 to 11, characterized in that the sealing ring (6, 6A, 6B, 28, 34, 52) is provided with at least one sealing lip (7, 7A, 8, 8A) at its outer diameter.
13. A package assembly according to claim 2, characterized in that the integral membrane container has at least one additional membrane layer.
14. A package assembly according to any of claims 1 to

13, characterized in that the front outlet tube (4, 51) comprises a closure having a burstable or pierceable diaphragm (33).

15. A package assembly according to any of claims 1 to 14, characterized in that the front outlet tube (4, 51) is closed by a sealing plug (9). 5
16. A package assembly according to any of claims 1 to 14, characterized in that the front outlet tube (4, 51) is closed by a self closing valve (41). 10
17. A package assembly according to any of claims 1, 3, 5 to 15, characterized in that the closed back end of the membrane container (12) has, at it's centre, a compressible plug (14) and a closure element (13) over it's outer diameter. 15
18. A package assembly according to claim 17, characterized in that the compressible plug (14) has an increased diameter on at least one of it's ends. 20
19. A reusable cartridge assembly for dispensing at least one component, comprising at least one cartridge cylinder (20A, 20B, 43A) having a rigid wall, a cartridge outlet (21, 57) and a package assembly (1A, 1B, 42A) according to any one of the claims 1 to 16 within the cylinder, characterized in that the sealing lips (7, 7A, 8, 8A) of the sealing ring (6, 6A, 6B, 28, 34, 52) or the sealing element (26) are sealing within the bore of the cartridge outlet (21, 57). 25  
30
20. A cartridge assembly according to claim 19, characterized in that the cartridge assembly further comprises a driven piston (22A, 22B), the piston and the piston side ends of the wall of the cartridge cylinder being arranged such that the membrane container is turned "outside in" by the action of the piston. 35  
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21. A cartridge assembly according to claim 19 or 20, characterized in that the cartridge outlet (21, 57) comprises a pin (35) for opening the self closing valve (41). 45
22. A method for filling the package assembly according to any of claims 1-18, characterized in that, prior to filling, the membrane container having an open front end is turned "outside in", then vacuum is applied at the outlet end for complete air evacuation, whereupon the membrane container package is filled with the chemical content free of air and closed by the outlet closure elements. 50  
55

FIG. 1

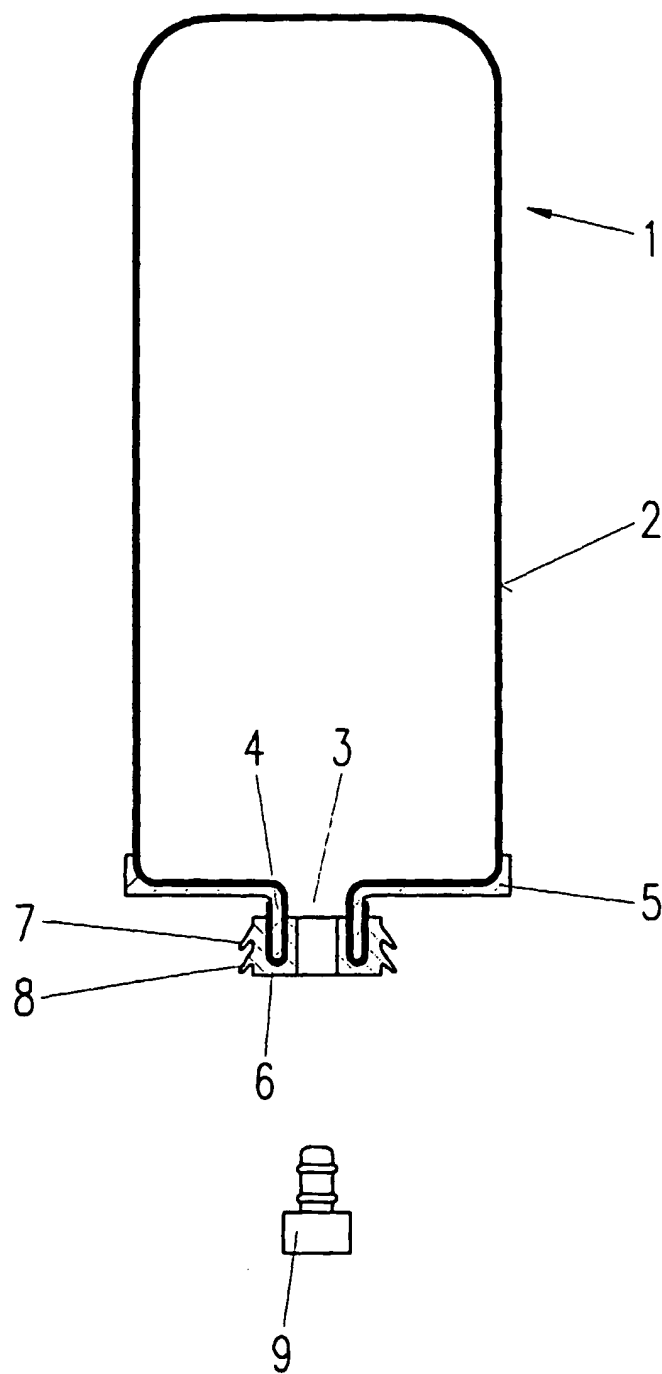


FIG. 2

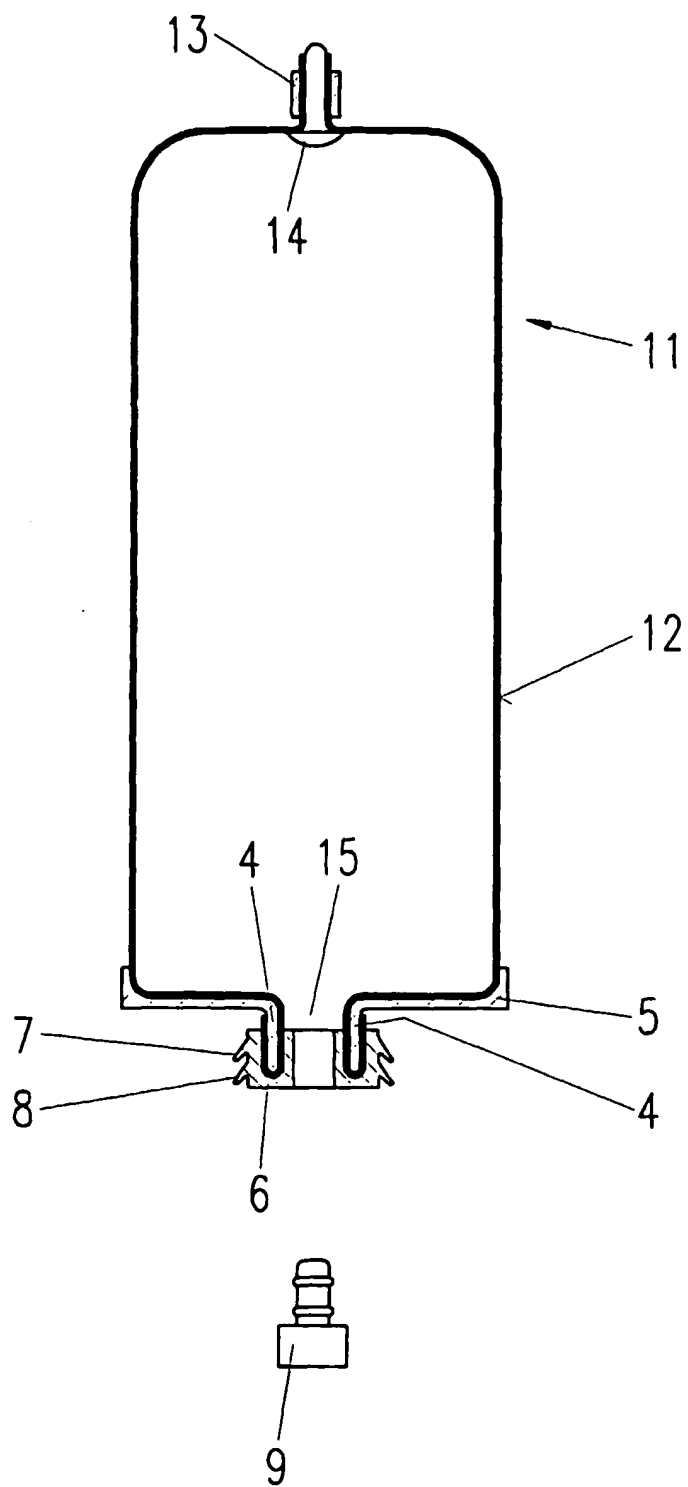


FIG. 3

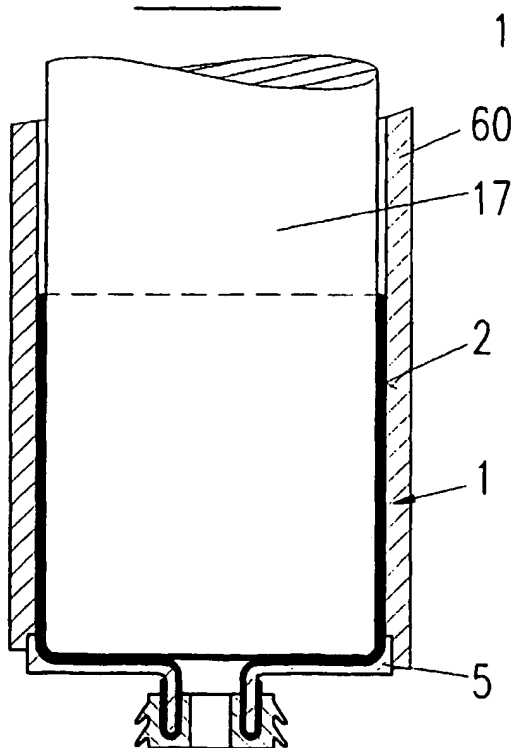


FIG. 4

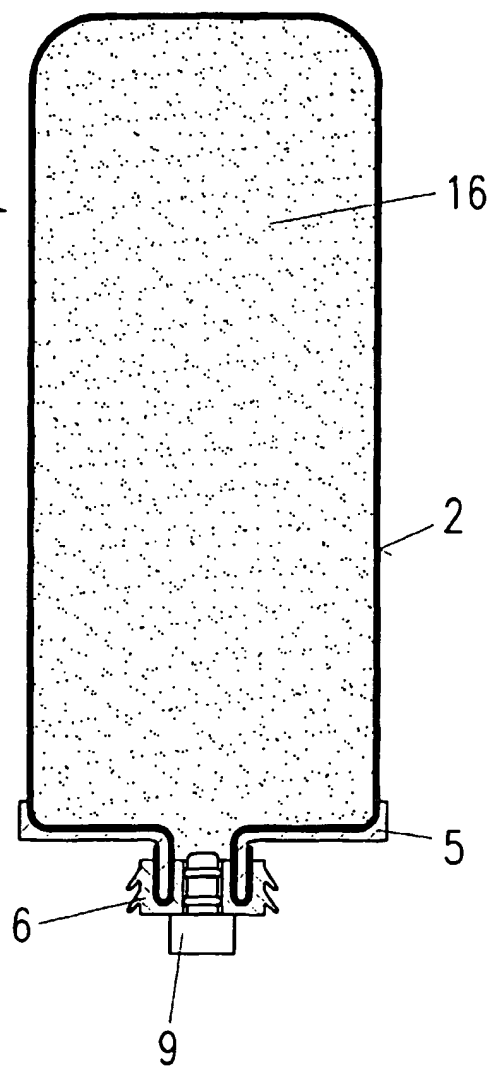




FIG. 5

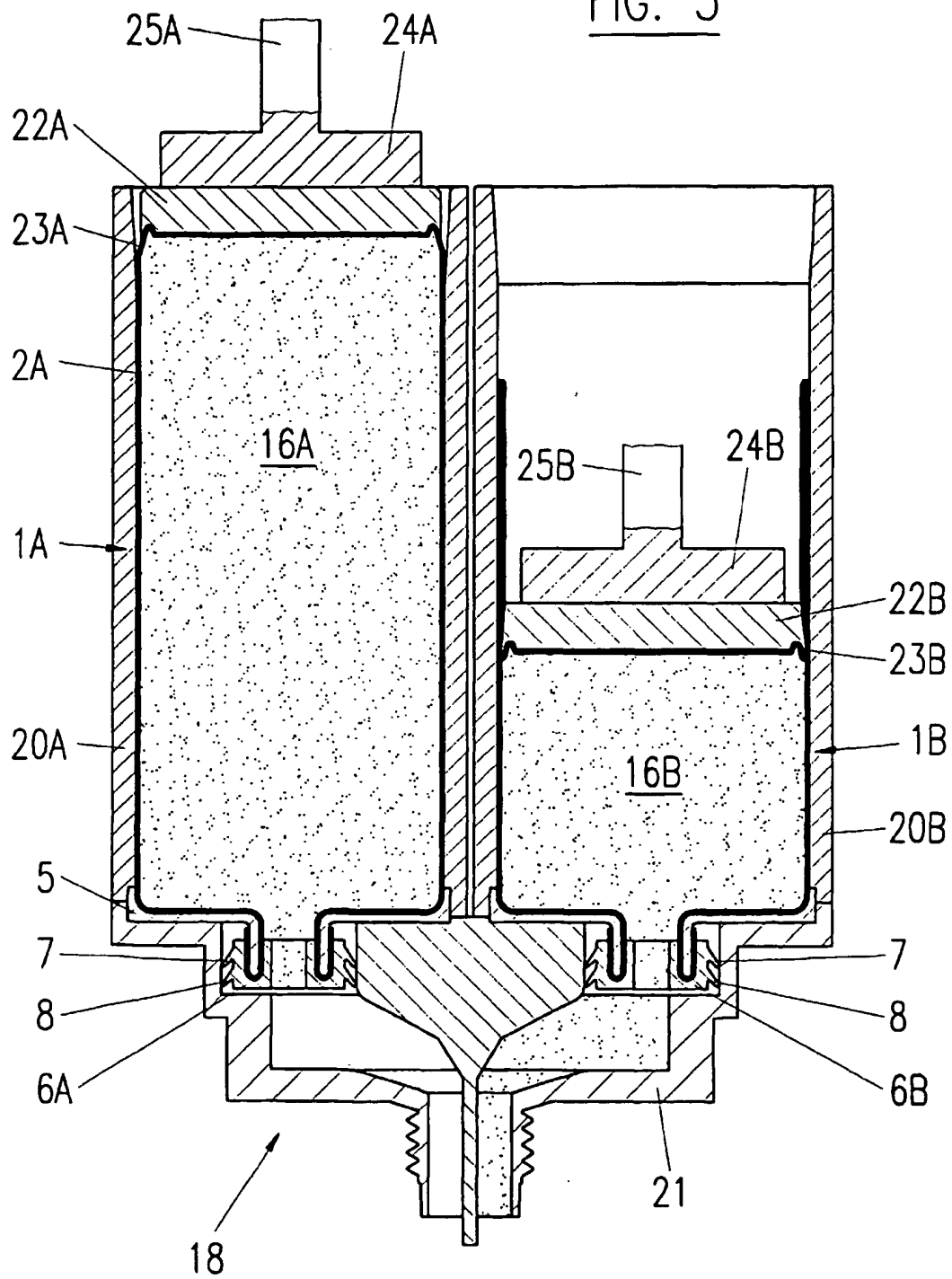


FIG. 6

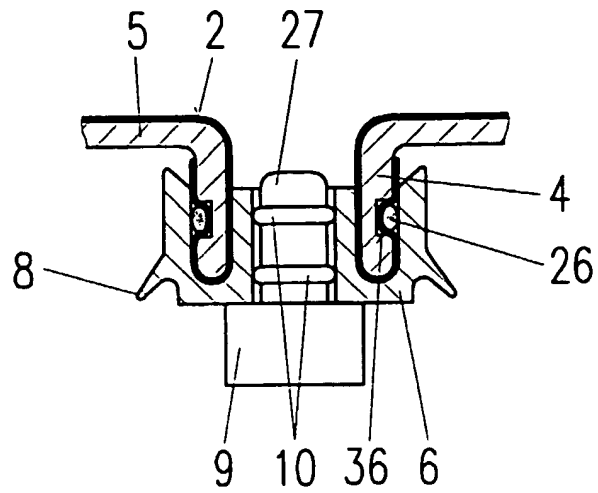


FIG. 7

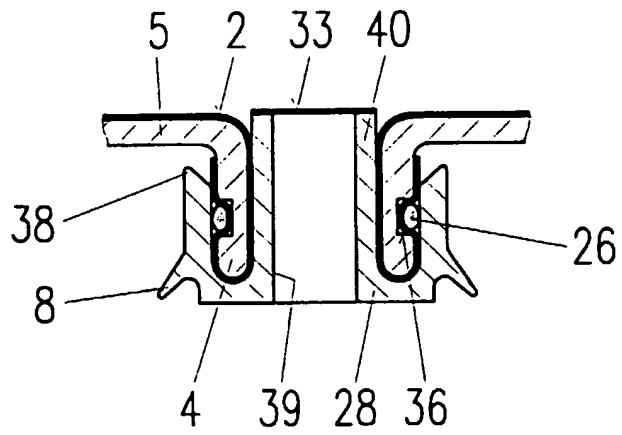


FIG. 8

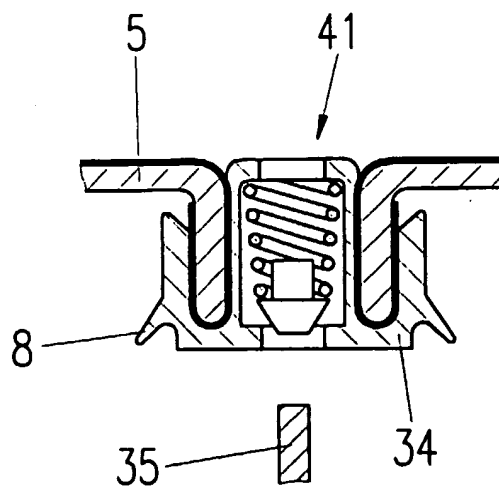


FIG. 9

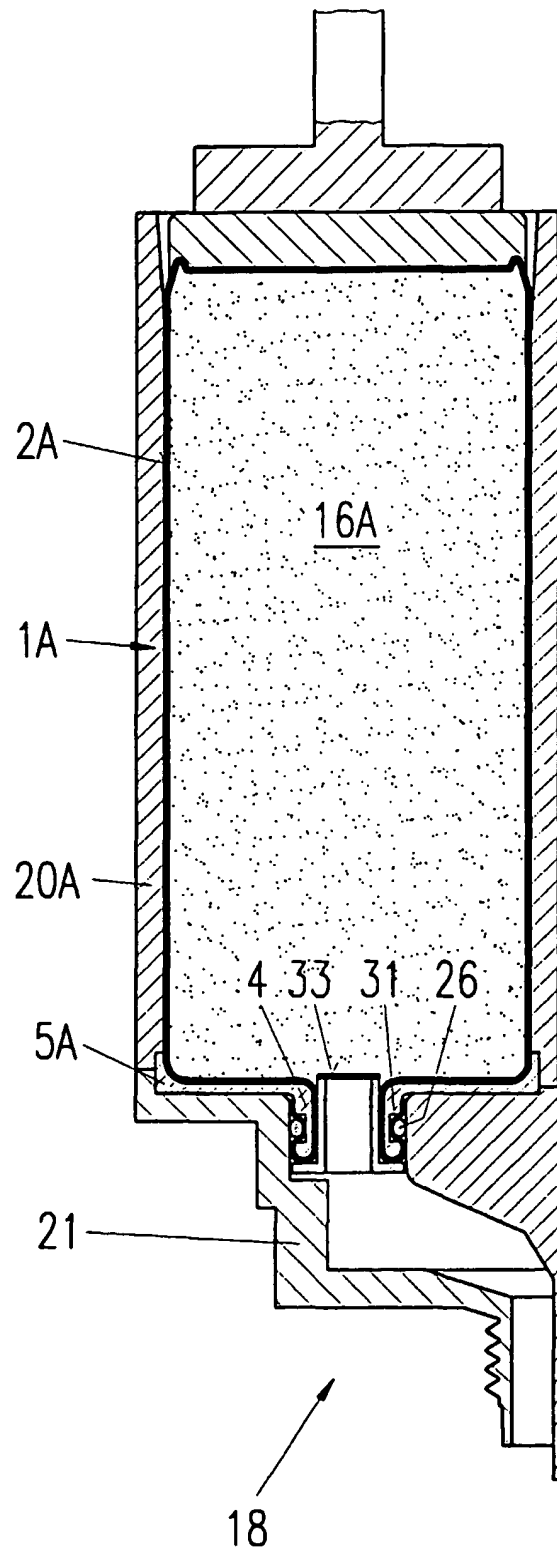
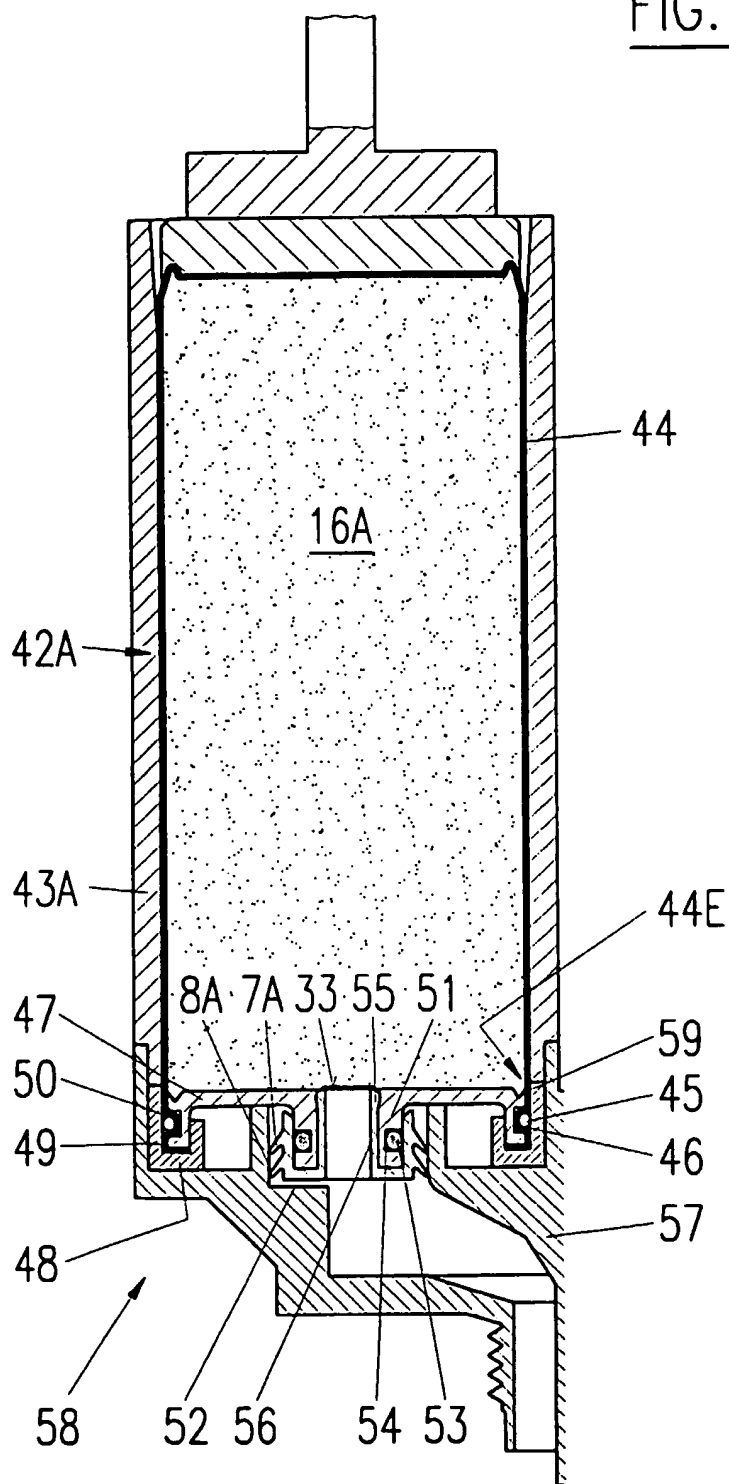


FIG. 10





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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 81 1014

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	--- -/--		
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>10 November 1999</b>	Examiner <b>Pernice, C</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 81 1014

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 November 1999	Examiner Pernice, C
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P04C01)



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Application Number

EP 98 81 1014

#### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

#### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet 8

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number  
EP 98 81 1014

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-21

A package assembly to be used within reusable cartridge assembly, comprising a thin flexible membrane wall, a front outlet, and a ring-shaped sealing element for fixing the membrane wall to said front outlet. Said cartridge assembly comprising a cartridge cylinder, a cartridge outlet and means for fixing said package assembly to the cartridge.

2. Claim : 22

A method for filling the package assembly comprising the steps of turning the membrane wall "outside in", applying vacuum for complete air evacuation, filling the package with a product, and closing the package.



**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 81 1014

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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10-11-1999

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